ANNUAL PROGRESS REPORT

SEATO Medic Study No. 48	Culicoides of Thailand
Project No. 3A 025601 A 811	Military Medical Research Program S. E. Asia
Task 01:	Military Medical Research Program S. E. Asia
Subtask 01:	Military Medical Research Program SEASIA (Thailand)
Reporting Installation:	US Army-SEATO Medical Research Laboratory APO 146, San Francisco, California
	Division of Medical Research Laboratories
	Department of Medical Entomology
Period Covered by Report:	1 April 1963 to 31 March 1964
Principal Investigator:	Miss Niphan Chanthawanich
Associate Investigator:	Dr. W. W. Wirth*
Reports Control Symbol:	MEDDH-288
Security Classification:	UNCLASSIFIED

* United States National Museum

ABSTRACT

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The object of this study was to determine the species of Culicoides (biting midges) found in Thailand. Samples of biting midges, flies of the genus Culicoides, family Ceratopogonidae, were collected in a number of parts of Thailand during collections of mosquitoes. The Culicoides were identified and tabulated by area. More extensive

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studies of the Culicoides population were made at a horse farm in Southeastern Thailand, and information was accumulated there on the relative seasonal abundance of the species. Thirty one species of Culicoides were collected during the study including several not previously described. Large numbers of additional specimens were sent to the United States National Museum, to be used in a projected study of the Culicoides fauna of all of SE Asia.

BODY OF REPORT

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FINAL REPORT

Objective: To determine the species of Culicoides present in Thailand, and to make observations on their biologies and habits. These data are to serve as a basis for possible future disease studies with these biting Diptera, which are known virus vectors in other parts of Asia.

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Description: Culicoides were removed from light trap collections from a number of areas in Thailand, which these collections were being examined for mosquitoes. The Culicoides were preserved in alcohol and as time permitted they were dissected, placed on slides and identified. Small collections of man-biting species were also made during mosquito biting collections.

Progress: For identification the Culicoides were first subdivided according to the number of functional or non-functional spermathecae in the females. These groups were coordinated and further subdivided by the use of wing pattern characters. Keys have been constructed for the identification of the species collected in this study (Table 1) or reported to occur in Thailand (Table 2). Four types of spermathecal pattern were found in the study:

a. Species with only one elongated spermatheca.

b. Species with two developed spermathecae, with or without an additional rudimentary spermatheca.

c. Species with three functional spermathecae, subequal in size

d. Species with three functional spermathecae, one much larger than the remaining two.

A large number of wing pattern types were found, and these have been photographed with the aid of a phase contrast microscope for future publication.

During the study, specimens were examined from 175 light trap collections and a small number of other miscellaneous collections. Nine hundred seventy two canada balsam slide mounts were prepared.

The greater part of the collections from Bangkok and Chiengmai made from light trap collections from 1962 to 1963 were forwarded to the United States National Museum for study. These will form part of the material for a complete review of the Culicoides fauna of SE Asia which is being undertaken by Dr. Wirth and cooperating specialists. A small number of the alcohol preserved Culicoides from Bangkok and Chiengmai were examined by the principal investigator, as a basis for future work, and the following species were identified:

Bangkok (Light traps in the city, 5 ft. above sea level)

Culicoides peregrinus, C. schultzei, C. gewertzi, C. guttifer, C. arakawai, C. orientalis and C. recurvus.

TABLE 1

List of species of Culicoides
(1962-1963)

Culicoides actoni Smith
" albibasis Wirth & Hubert
" amamiensis Tokunaga
" anophelis Edwards
" arakawai (Arakawa)
" baisasi Wirth & Hubert
" distinctus Sen. & DasGupta
" flavescens Macfie
" flaviscutatus Wirth & Hubert
" geminus Macfie
" Gewertzi Causey
" guttifer (Meijere)
" huffi Causey
" humeralis Okada
" insignipennis Macfie
" mcdowelli Delfinada
" orientalis Macfie
" palpifer D. & G.
" paraflavescens Wirth & Hubert
" pelilioensis Tokunaga
" peregrinus Kieffer
" Recurvus Delfinals
" schultzei Enderlein
" shortti Smith & Swaminatah
" sigaensis Tokunaga
" similis Macfie
" tenuipalpis Wirth & Hubert
" n. sp. (gymnopterus group.)
" n. sp. (gymnopterus group.)
" n. sp. (orientalis group)
" n. sp. (orientalis group)

TABLE 2

Culicoides species reported from Thailand- not present in SMRL collections

Culicoides	andrew Causey
"	clavipalpis Muckerji
"	corti Causey
"	denmeadi Causey
"	elbeli Wirth & Hubert
"	hegneri Causey
"	hewilti Causey
"	jacobsoni Macfie
"	liui Wirth & Hubert
"	macfie Causey
"	pampangensis Delfinado
"	raripalpis Smith
"	shermani Causey
"	sumatre Macfie

TABLE 3

Relative abundance of Culicoides species, Bang Phra, Cholburi
June 1963 to February 1964

Culicoides	Jan.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
amamiensis	44.3	17.1	3.5	3.6	0.2	1.0	1.4	17.6	13.3
peregrinus	39.4	44.4	54.1	85.4	85.7	78.8	68.5	38.5	35.2
schultzei	7.0	23.4	34.7	6.9	6.4	3.3	4.1	3.1	6.0
orientalis	5.5	10.4	6.0	2.8	2.5	7.5	5.6	12.7	13.5
geminus	0.2	0.8	0.1	0.1	-	3.4	6.2	2.4	3.2
recurvus	-	-	0.1	0.1	1.3	1.6	2.7	0.3	-
(Trithecoides) sp.	1.7	0.6	0.3	0.3	1.2	2.1	2.8	10.7	12.0
Other sp.	1.9	3.3	2.2	0.8	2.7	2.3	8.7	14.7	16.8
Sample Size	1142	846	1382	1223	1553	980	711	291	1041

Chiengmai (Light traps on the outskirts of the city, 1000 ft. altitude)

Culicoides peregrinus, C. schultzei, C. palpifer, C. arakawae, C. shortti, C. huffi, C. humeralis, C. orientalis, C. amamiensis, C. mcdowelli and C. guttifer.

Additional collections were examined from a number of the sites visited by teams engaged in the collection of mosquitoes for virus isolation. These collections were generally not extensive enough to give a complete picture of the Culicoides population, but they permit an extension of the known distribution of several of the species in Thailand. Of particular interest were the collections of specimens biting man on Khao Yai, a newly opened National Park northeast of Bangkok. Other collections, largely by light trap, were made at: Petchburi- on the southeastern coastal plain; Karnchanaburi- in the foothills of the mountains bordering Burma; Udorn- on the Northeastern plateau; Prachuabkhirikhan on peninsular Thailand; Rajburi, southwest of Bangkok at the head of the Gulf of Thailand. Each of these areas represents a somewhat different environment, but there was considerable overlap in the species encountered in the various areas. The following species were identified:

Petchburi (on the coastal plain, west coast of the Gulf of Thailand):

Culicoides peregrinus, C. shortti, C. actoni, C. orientalis, C. amamiensis, C. arakawai.

Rajburi (on the coastal plain, north of Petchburi and closer to the Bangkok metropolitan area):

Culicoides peregrinus, C. shortti, C. arakawai, C. amamiensis, C. guttifer, C. orientalis, C. schultzei, C. huffi, C. sp.nov.

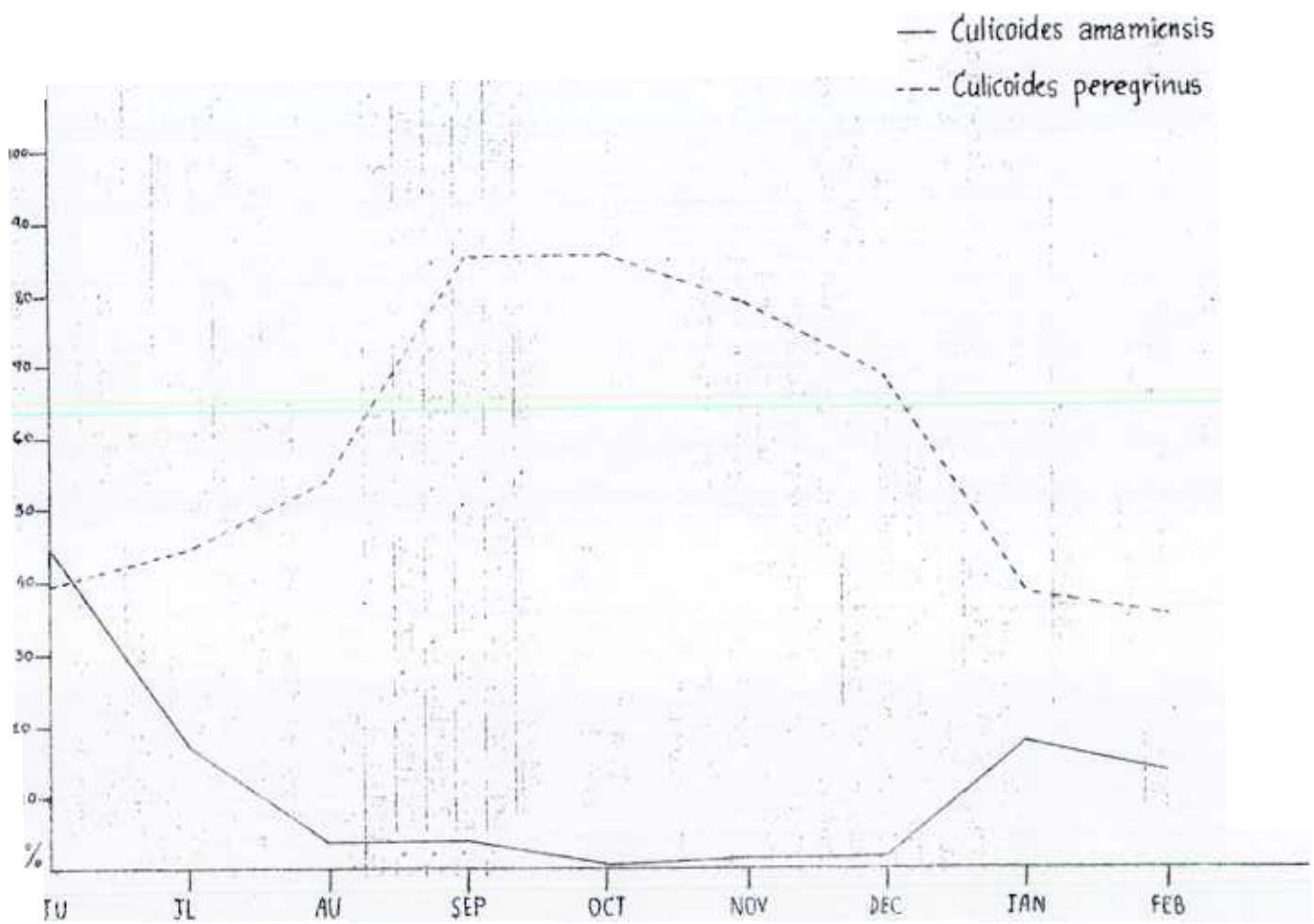
Prachuabkirikhan (on the coastal plain, south of Petchburi, on the narrow portion of the Kra Isthmus):

Culicoides sigaensis, C. pelliliouensis

Karnchanaburi (Northwest of Bangkok, in the foothills of the Blauktaung Range, altitude, 400 feet):

Culicoides orientalis, C. amamiensis, C. schultzei, C. shortti, C. palpifer, C. tenuipalpis, C. baisasi, C. huffi and C. insignipennis.

Figure 1. Two types of seasonal pattern, Culicoides species Bang Phra, Chonburi. June 1963 to February 1964.



Khao Yai National Park (Northeast of Bangkok in a region of tropical hill forest, altitude 2500 feet):

Culicoides amamiensis, C. humeralis, C. actoni.

Udorn (On the Korat plateau, in the dry northeastern part of the country altitude 700 feet)

Culicoides arakawai, C. peregrinus

The major portion of the identification effort was devoted to a study of the Culicoides collected during mosquito-borne virus studies at the horse farm operated by the Red Cross Society of Thailand at Bang Phra in Cholburi Province, southeast of Bangkok (See Study No. 41). This site offered a particularly good collection area, since large numbers of Culicoides were found in the light trap material through most of the year. Members of the genus have been implicated in the transmission of African horse sickness in India and Pakistan. It is unlikely that this disease will appear in coastal Thailand, since it is associated with rather xeritic conditions, but it was believed that it would be well to have some indication of the status of Culicoides populations near a large group of horses.

A list of the species encountered at Bang Phra from June 1963 to February 1964 follows:

Culicoides palpifer, C. humeralis, C. anophelis, C. peregrinus, C. schultzei, C. shortti, C. orientalis, C. amamiensis, C. similis, C. arakawae, C. guttifer, C. flavescens, C. recurvus, C. paraflavescens, C. albibasis, C. hiffi, C. pelilioensis, C. distinctus, C. flaviscutatus, C. geminus, C. mcdowelli, C. actoni, C. sp. ornatus group, C. sp. orientalis group, C. sp. gymnopterus group No.28, C. sp. gymnopterus group No. 9.

None of the species recovered appears to have been implicated as a vector of equine disease. The most abundant species through most of the year at Bang Phra was C. peregrinus, although C. amaminesis was the most abundant species during June. Other species predominated in the limited catches from other areas: C. amamiensis at Khao Yai, and Karnchanaburi; C. arakawae at Udorn and Rajburi. C. shortti was the most abundant species at Petchburi, while too few specimens were collected at Prachuabkirikhan to permit a generalization.

Ten of the species of Culicoides collected are reported to feed on man, although only three (indicated by asterisks) were found doing

so in this study. The general impression received is that Culicoides are rarely found to be an important human pest in Thailand. They may, of course, escape unnoticed by collectors due to the more obvious attacks by mosquitoes. The ten anthropophilic species known for Thailand are: C. anophelis, C. flavescens, C. flaviscutatus, C. humeralis; C. amamiensis; C. peliliouensis, C. actoni; C. shortti, C. gewertzi and C. sigaensis. The first named species, C. anophelis, is remarkable for its habit of obtaining a "second hand" meal of blood by engorging through the stomach wall of Anopheles mosquitoes which are in the act of feeding or have recently fed on a warm blooded host. C. anophelis was collected in this study while attached to Anopheles splendidus and A. jeyporiensis candidiensis. Cattle serve as hosts C. flavescens, C. similis and C. anophelis. One of the species, C. arakawae commonly feeds on domestic fowl, and may transmit a varioloid disease to them. No specimens were collected from cattle or birds during this study.

Many of the species found in Thailand were originally described elsewhere in Asia, and one species (C. similis) was first described from the Gold Coast, Africa, although later found in India as well. C. amamiensis, C. peregrinus and C. sigaensis were first described from Japan; while C. peregrinus, C. anophelis, C. shortti, C. similis, C. actoni, C. distinctus and C. recurvus were described from India.

Summary: Culicoides (biting midges, punkies, sand flies) were collected in several parts of Thailand and identified and tabulated. Large numbers were found during routine operation of mosquito light traps, but relatively few were collected biting man. Thirty-one species were identified. In the Bang Phra area large numbers of Culicoides were found on a horse farm, and it is believed that many of the species collected feed readily on large domestic animals. In view of the large numbers present in some areas they deserve additional attention.

Conclusions: Many species of the genus Culicoides occur in Thailand, some of them in large numbers. While these blood-sucking midges have not been implicated in the transmission of human or animal disease in Thailand their habits make them worthy of additional attention. It is likely that many more species will be found here.

Publications

1. Chanthawanich, Niphan, 1964. Observations on the genus Culicoides (Diptera, Ceratopogonidae) in Thailand. A thesis presented to the Graduate Faculty, Chulalongkorn University in partial fulfillment of the requirements for the degree of Master of Science.